**Worksheet – Identifying Bonds**

Ms. OK, AP Biology, 2014-2015

Each atom has a particular electronegativity—defined as the attraction of the protons in the nucleus to the electrons in the energy shells. An atom’s level of electronegativity results in the electrons in the energy shells being held to the nucleus of the atom with a particular “tightness”.

When an atom has a much higher electronegativity than another atom, it can actually “steal” one or more electrons from the second atom, resulting in an ionic bond. When the electronegativity difference between two atoms is greater than or equal to 1.8, the bond between these atoms is considered ionic.

When an atom has a slightly higher electronegativity than another atom, it will share electrons with the other atom, but it will hold them a little more tightly. This will result in a slight negative charge on the first atom and a slightly positive charge on the second atom. This is called a polar covalent bond. When the electronegativity difference between two atoms is between 0.5 and 1.7, the bond between these atoms is considered polar covalent.

When two atoms have approximately equal electronegativities, they will share electrons evenly. This is called an a non-polar covalent bond. When the electronegativity difference between two atoms is less than or equal to 0.4, the bond between these atoms is considered nonpolar covalent.



1. The molecule diagrammed to the right can also be represented by the formula CH3COOH:

Identify each of the bonds in the image to the right as ionic, polar covalent, or nonpolar covalent. Explain each of your choices. You will need to know the electronegativities of carbon, hydrogen, and oxygen, which are given below.

(Note: The bonds you must describe are the bonds between carbon and hydrogen, carbon and carbon, carbon and oxygen, and oxygen and hydrogen.)

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| --- | --- |
| **Element** | **Electronegativity** |
| Carbon | 2.5 |
| Hydrogen | 2.1 |
| Oxygen | 3.5 |

2. Which one of the atoms shown would be most likely to form a cation (a positively charged ion) with a charge of +1? Circle your choice and provide a written explanation.

